

Materials Tip



Materials Engineering Branch

Cleaning of Flight Cable Assemblies Prior to Integration			
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Cables (harnessing) represent one of the most significant sources of contamination in any flight package. It is often assumed that if every material used in the cable assembly is approved, then there should be no concern about contamination. This assumption has adversely affected several space flight programs.

Cable assemblies are usually not fabricated in cleanrooms, and hardly ever with gloved hands. In reality, these cables are usually strung along the floor in ordinary work areas for times as long as several months where people can, and often do, walk on them. Not only can they accumulate contamination in this way, the assemblies often weigh many pounds (kilograms). Therefore, even if the materials of construction have a low contamination level, the amount of contamination may be significant due to the large mass of the harness. Therefore, there is always the risk of contamination from processing and from the basic materials of fabrication. The relative amounts of each vary from case to case, but they are always present, as evidenced in numerous thermal vacuum tests performed by our laboratories in over thirty years of testing.

To prevent contamination of an instrument or spacecraft, the cables must be cleaned prior to exposing the cables and payload to vacuum test and/or flight. The best way to clean cables is to first vacuum them thoroughly, then wipe them with alcohol-dampened cloths to reach all accessible areas, and finally to vacuum bake them at about 85°C for 48 hours with a LN₂ cooled scavenger plate and quartz crystal micro balance (QCM) in place. Determining when the cables are clean enough depends on the cleanliness level required by the program. The QCM should be cooled to -10°C to -20°C and the cleaning cloths and alcohol quality must be approved by a quality assurance representative or a materials engineer. Thereafter, when the cables are clean, steps must be taken to keep them clean. As a result, they should be handled with approved gloves and packaged in approved wrap until they are installed and in a cleanroom environment.